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ABSTRACT

5 A security screen 10 includes a rigid frame 12 that retains a woven wire mesh 14. The frame 12 is provided with a recess 16 extending thereabout. The mesh 14 is formed with a first bend about its periphery to form a hook like structure 18 that is inserted into the recess 16. A retaining strip 20 is attached to the frame 12 and has a tongue 22 that locates in both the hook like structure 18 and the recess 16 so as to retain the mesh 14 in the frame 12 without any clamping action.



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**DIVISIONAL SPECIFICATION FOR A
STANDARD PATENT**

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Divisional Specification for the invention entitled:

SECURITY SCREEN

The following is a full description of this invention, including the best method of performing it known to me:

SECURITY SCREEN

The present invention relates to a security screen and, in particular, but not exclusively, to a security screen for a window or doorway.

5 Many different types of security screens are presently available for protecting residential and commercial properties from third party intrusion. One type of known security screen comprises a simple steel bar grille which is either bolted or otherwise attached across a window or is configured in a door like manner for locking across a doorway. Other security screens are known that comprise a wide grate mesh made from expanded aluminium bolted across or otherwise fixed to a peripheral frame.

10 While these known screens are effective in preventing or at least deterring intrusion they are aesthetically detract from the property. An attempt to improve the aesthetics has been made and disclosed in Australian Application No 24001/95 which describes an intruder resistance screen having a frame and a wire woven mesh attached to the frame. This specification discloses the use of a clamp to clamp the peripheral edge of the mesh into the frame. Clamping members are shown which physically compress or squash the periphery of the mesh against the frame of the screen. Additionally, fastening of the mesh can be achieved by use of mechanical fasteners such as screws or rivets which pass through the periphery of the mesh.

15 The screen is in accordance with AU 24001/95 performs its intended function adequately and overcome the problems with the aesthetics of the grill or grate type security screens. Nevertheless, it is believed that the method of fastening the mesh to the frame does not maximise the impact resistance of the screen.

It is accordingly an object of the present invention to provide a security screen with an alternate arrangement for fastening the mesh to the frame of the screen.

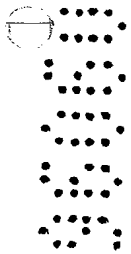
20 According to the present invention there is provided a security screen including:
a rigid frame having a recess extending thereabout;

a woven wire screen, the periphery of the screen provided with a first bend to form a hook like structure that is inserted in the recess; and,
a retaining strip attached to or formed integrally with the frame and having a piece that effectively closes the recess and can provide an abutment for the hook like structure to thereby retain the mesh in the frame without a clamping action.

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Preferably said security screen further includes one or more mechanical fasteners for fastening said retaining strip to said frame wherein the fasteners are applied at locations and are of a length so that they extend into said recess at a position on the outside of the hook like structure.

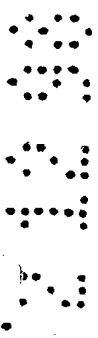
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In one embodiment the piece includes a tongue that locates in both the hook like structure and the recess.

In an alternate embodiment the retaining strip is substantially L shaped in section with a foot of the L shaped retaining strip forming said piece that extends across and effectively closes said recess and the leg of the L shaped retaining strip fastened in overlying relationship to said frame.

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In an alternate embodiment the retaining strip is substantially L shaped in section having a foot forming said piece that is located inside the recess and fastened to the frame and a leg that extends transversely to said foot and locates inside hook like structure and said recess.

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Preferably the first bend is one of a plurality of bends formed about the periphery of the mesh.

Preferably said piece is provided with two or more tongues that located in individual ones of the bends.

Preferably said recess is provided with a transversely extending flange that locates in one of said bends.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

5 Figure 1A is a schematic plan view of a security screen in accordance with the first embodiment of this invention;

Figure 1B is a view of section AA of the security screen shown in Figure 1A;

Figure 1C is an exploded view of the section shown in Figure 1B;

10 Figure 2 is a cross sectional view of a second embodiment of the security screen;

Figure 3 is a cross sectional view of a third embodiment of the security screen;

Figure 4 is a cross sectional view of a fourth embodiment of the security screen;

15 Figure 5 is a cross sectional view of a fifth embodiment of the security screen; and

Figure 6 is a cross sectional view of a sixth embodiment of the security screen.

Referring to Figures 1A-1C, in general terms, the security screen 10 includes a rigid frame 12 that retains a woven wire mesh 14. As seen most clearly in Figures 1B and 1C the frame 12 is provided with a recess 16 extending thereabout. The woven wire mesh 14 is formed with a first bend about its periphery to form a hook like structure 18 that is inserted into the recess 16. A retaining strip 20 is attached to the frame 12 and has a piece 21 that effectively closes the recess 16. The piece 21 includes a

5 tongue 22 extending at right angles that locates in both the hook like structure 18 and the recess 16 so as to retain the mesh 14 in the frame 12 without any clamping action. The absence of clamping action comes about because the piece 21 (including tongue 22) is spaced from the frame 12 by distance greater than the thickness of the mesh 14.

Typically, the frame 12 would be made of a number of lengths of extruded aluminium that can be joined or otherwise formed into the desired shape of the screen 10. These lengths typically include a rectangular box section 24 a C shaped section 26 which defines the recess 16 and a web 28 which joins the box section 24 and C section 26. The lengths of aluminium can be joined together by any known technique to form the frame 12.

The retaining strip 20 is also in the form of a extruded length of aluminium substantially in the shape of a reversed and squared C. In this embodiment, the tongue 22 forms a bottom run or portion of the reversed C and is of a thickness greater than the remaining portion of the retaining strip 20. Also, the upper run or portion of the retaining strip 20 is of a length slightly greater than the tongue 22.

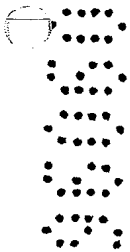
The retaining strip 20 is dimensioned so that when it is fastened to the frame 12 a gap is left between the retaining strip 20 and the frame 12 of a width greater than that of the mesh 14 so that there is no effective clamping action on the mesh 14. Typically the retaining strip 20 is attached to the frame 12 by rivets 30. Although other mechanical fasteners such as screws can be used.

The mesh 14 is typically made from stainless steel and has a mesh spacing similar to that of mesh used for fly screens, ie small enough to prevent the passage of insects such as flies and mosquitoes therethrough. For example the mesh may be made from 0.9 mm diameter stainless steel wire woven with 2.2 mm square spacings.

The mesh 14 is effectively retained in the frame 12 because of the considerable force required in order to straighten the bend or hook like structure 18 formed about the

periphery of the mesh 14. It will be appreciated that the force required to be applied to the screen 14 is order to pull it from the frame 12 must be extremely high as it is required to effectively straighten out the whole of the length of the bent over portion 18.

- 5 The placement of the rivet 30 on the outside of the bend or hook like structure 18 that extends into the recess 16 can further assist in increasing the force required to pull the mesh 14 from the frame 12. This is because this placement effectively narrows the space or gap in which the bend 18 can be straightened, ie it effectively increases the "tightness" of the gap in through which the mesh 14 must pass in order to be pulled from the frame 12.



- 10 It is believed that this hook like retaining arrangement provides greater security against withdrawal of the mesh 14 than clamping. The reason for this is that in clamping, pressure must necessarily be applied to the mesh in order to hold it in place. Therefore the mesh 14 is already preloaded prior to any attempted intrusion.
- 15 As a result, the clamping forces may actually assist in the breaking of the mesh 14 when under attack. Also, the known prior art clamping technique also usually includes the use of mechanical fasteners that pass through the periphery of the mesh. The passage of the fasteners through the mesh acts to weaken the total strength of the screen. These disadvantages are largely avoided by embodiments of the present inventions.



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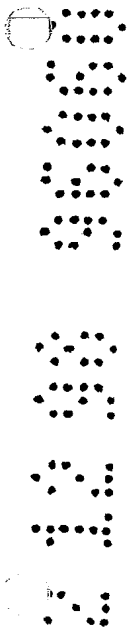
- 25 The second embodiment of screen 10' shown in Figure 2 is particularly suited for use as a cyclone screen. The screen 10' differs from the screen 10 shown in Figures 1A-1C largely by the omission of the web 28 in the aluminium extrusion forming the frame 12 and the inclusion of a stiffening rail 32 on the side of the frame 12' on which the retaining strip 20' is fastened. In order to prevent damage during a cyclone it is critical that if the screen 14' is impacted by flying debris that it does not deflect inwardly to an extent so as to break a window located there behind. The stiffening rail 32 acts to positively space the frame 12' and mesh 14' a distance in front of a window greater than the maximum deflection that can be expected from

the screen 10' when impacted upon by flying debris. It is known that during cyclones the equalisation of air pressure between inside a house and outside that can occur if windows are broken often leads to the roof of the house being blown off. In all other respects the screen 10' is substantially the same as screen 10, and significantly, the arrangement for retaining the mesh 14' in the frame 12' is identical.

Figures 3 and 4 illustrate further alternate embodiments of the screen 10'' and 10'''. The substantive difference between these embodiments and those shown in Figures 1 and 2 is that the mesh is provided with a double bend or hook 18'' in Figure 3 and a triple bend or hook 18''' in Figure 4.

Looking more closely at Figure 3, the screen 10'' includes a frame 12'' of a form substantially similar to that shown in Figure 2 but without the stiffening rail 32. Here however, the retaining strip 20'' is of an substantially E shaped section with the tongue 22' formed as the central prong of the E shaped section and located in recess 16'' of the frame 12'' and within an upper one of the two bends in the hook like structure 18'' of the mesh 14''. A lower one of the bends of the hook like structure 18'' snakes between the tongue 22'' and lower prong 34 of the retaining strip 20' and a lower wall 36 of the frame 12''. Rivet 30'' mechanically attaches the retaining strip 20'' to the frame 12''.

In Figure 4, the mesh 14''' is provided with a triple hook or bend 18''' about its periphery. The retaining strip 20''' is of a substantially E shaped section and, the C shaped section 26 of the first and second embodiments is replaced with an E shaped section 26''' so as to defined two separate recesses 16A and 16B. The upper and lower bends of the triple hook 18''' are located in the recesses 16A and 16B respectively with a central bend of the triple hook 18''' turning about a central flange 38 of the E shaped section 26'''. The retaining strip 30''' includes pieces 22A and 22B that locate in the upper recess 16A and upper one of the triple bends 18'''; and, the lower recess 16B and the lower one of the triple bends 18''' respectively.



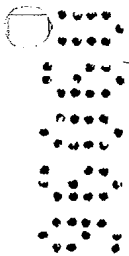
It will be appreciated that the forces required to pull the mesh 14 from the frame 12 increases with the number of bends created through which the mesh must pass in order to escape the frame.

Figure 5 illustrates one of the most basic embodiments of the screen 10*. In this embodiment, the screen 10* includes a C shaped frame 12* which defines a recess 16*. The mesh 14* is similar to that shown in the embodiments of Figures 1 and 2 and includes a single hook like structure 18* about its periphery. The main point of difference in the frame 10* of this embodiment with the previous embodiments is that the retaining strip 20* includes only a piece 21* for effectively closing off the recess 16*. That is, in this embodiment, the piece 21* does not include a tongue 22 similar to that shown in the other embodiments. Therefore, in its simplest form the retaining strip 20* is simply in the form of an L shaped extrusion. The piece 21* does however provide an abutment for the hook like structure 18* in the event that inward pressure is placed on the mesh 14*. As with the previous embodiments, a rivet 30* is used for joining the retaining strip 20* to the frame 12*.

From a study of the embodiments shown in Figure 5 it will also be apparent that the retaining strip 20* may be formed integrally with the frame 12*. In such an embodiment the hook like structure 18* would be worked into the recess 20* by suitable manipulation of the extrusions forming the frame 12* prior to the extrusions being connected together.

In Figure 6 the frame 12C is identical to frame 12 of Figure 1B however the retaining strip 20C is of an L shaped section having a squat foot forming the piece 21 for substantially closing off recess 16C and a transversely extending leg forming tongue 22C that locates in the recess 16C and hook 18C. Here the piece 21C is disposed inside the recess 16C and the retaining strip 20C is fastened to the frame 12C by a screw 30C that passes through an upper part of the frame forming the recess 16A.

Now that embodiments of the present invention have been described in detail it will be apparent to those skilled in the relevant arts and numerous modifications and variations may be made without departing from the basic inventive concepts. For example, the frame 12 and retaining strip 20 may be made from any material that is rated for the purpose of making security type screens. Also, any conventional fastening device or technique can be used for attaching the retaining strip 20 to the frame 12. While stainless steel wire is the preferred material for the mesh 14 the use of other wires is possible. Further while the embodiments disclose screens where the mesh has one, two and three peripheral bends, further bends can be provided. All such modifications and variations are deemed to be within the scope of the present invention the nature of which is to be determined from the above description and the following claims.



CLAIMS

1. A security screen including:
a rigid frame having a recess extending thereabout;
a woven wire screen, the periphery of the screen provided with a first bend to
5 form a hook like structure that is inserted in the recess; and,
a retaining strip attached to or formed integrally with the frame and having a
piece that effectively closes the recess and can provide an abutment for the
hook like structure to thereby retain the mesh in the frame without a clamping
action.
- 10 2. A security screen according to claim 1 further including one or more
mechanical fasteners for fastening said retaining strip to said frame wherein
the fasteners are applied at locations and are of a length so that they extend
into said recess at a position on the outside of the hook like structure.
- 15 3. A security screen according to claim 1 or 2 wherein the piece includes a
tongue that locates in both the hook like structure and the recess.
- 20 4. A security screen according to claim 1 or 2 wherein the retaining strip is
substantially L shaped in section with a foot of the L shaped retaining strip
forming said piece that extends across and effectively closes said recess and
the leg of the L shaped retaining strip fastened in overlying relationship to
said frame.
5. A security screen according to claim 1 or 2 wherein the retaining strip is
substantially L shaped in section having a foot forming said piece that is
located inside the recess and fastened to the frame and a leg that extends
transversely to said foot and locates inside hook like structure and said recess.
- 25 6. A security screen according to claim 1 or 2 wherein the first bend is one of a
plurality of bends formed about the periphery of the mesh.

7. A security screen according to claim 6 wherein said piece is provided with two or more tongues that located in individual ones of the bends.
8. A security screen according to claim 6 or 7 wherein said recess is provided with a transversely extending flange that locates in one of said bends.
- 5 9. A security screen substantially as herein described with reference to and as illustrated by the accompanying drawings.

Dated this 2nd day of December 1998

GRANT DOLAN

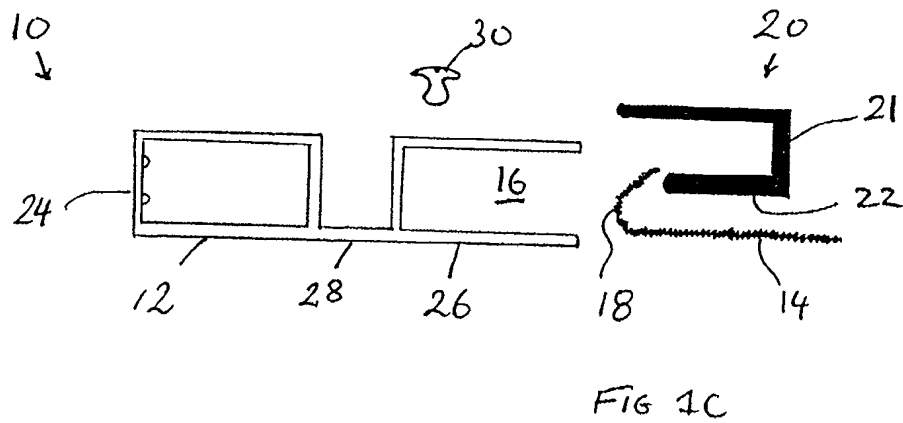
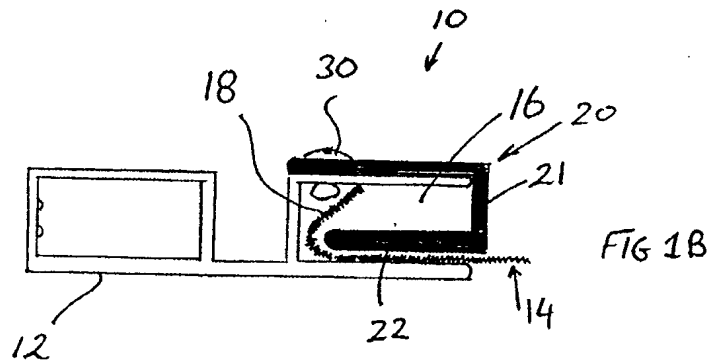
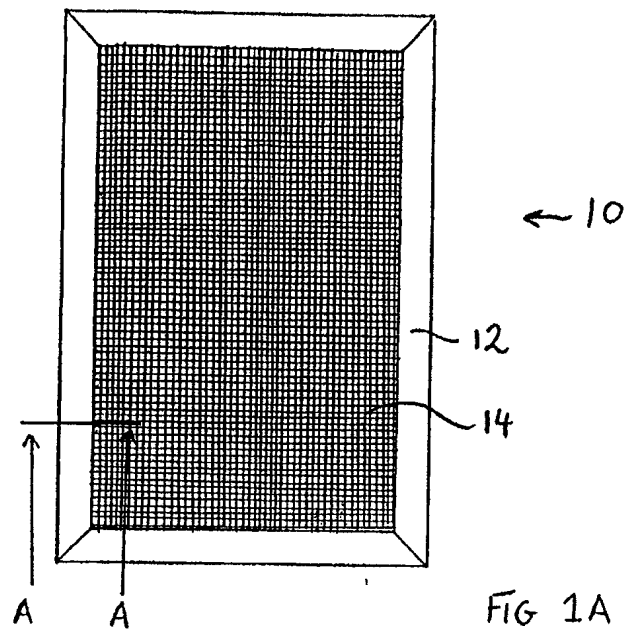
By His Patent Attorneys

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GRIFFITH HACK

Fellows Institute of Patent and Trade Mark
Attorneys of Australia

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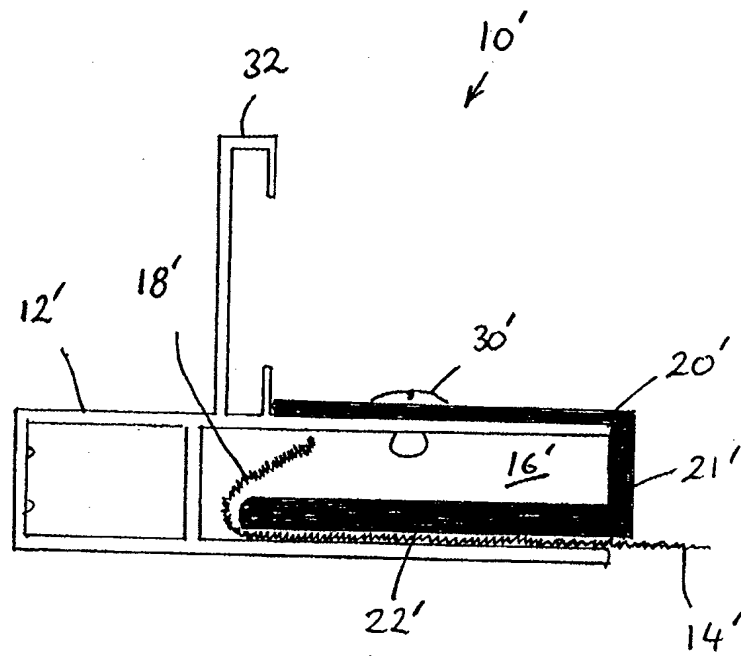


FIG 2

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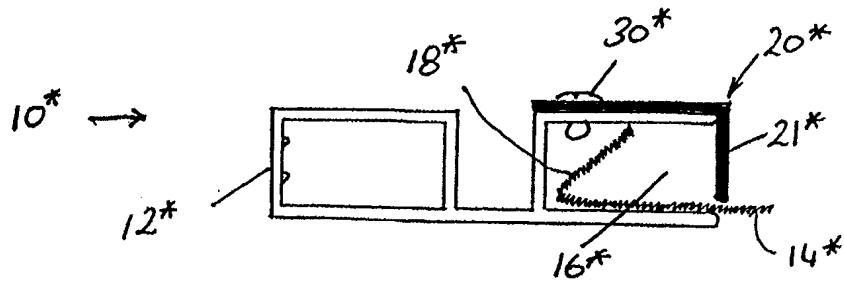


FIG 5

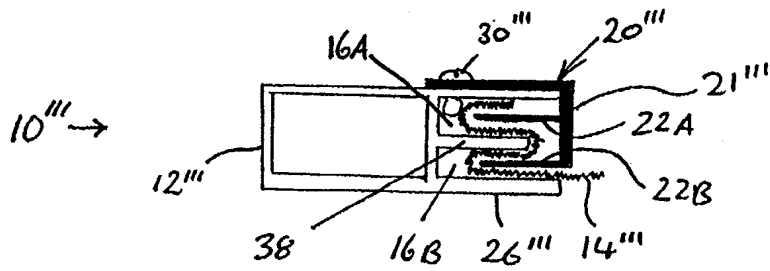


FIG 4

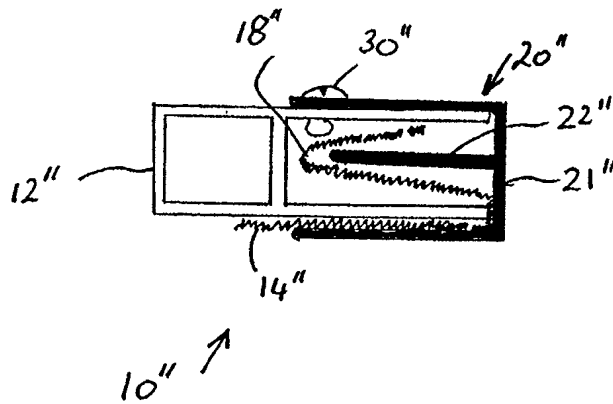


FIG 3

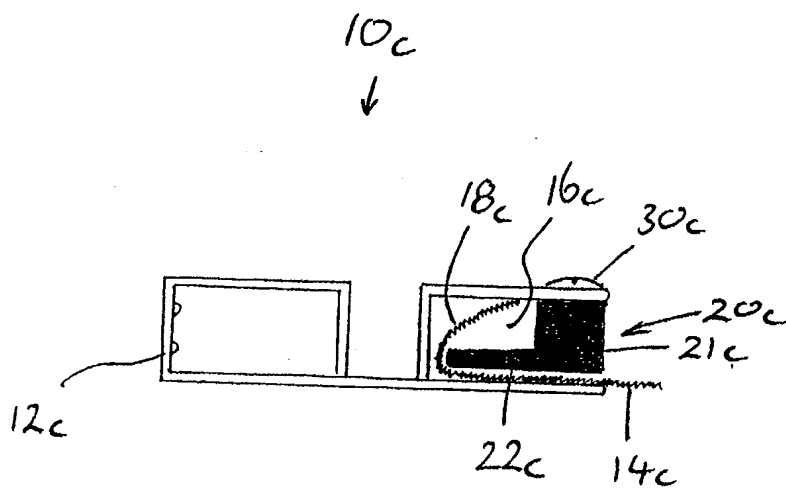


FIG 6